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told the work at Princeton as illustrated by the contribution under review, marks an important advance in this department of astronomy.

JOEL STEBBINS

An Index to the Museum Boltinianum. By WILLIAM HEALEY DALL. Smithsonian Publication No. 2360. 1915. 8vo. Pp. 64.

Rarely has the credit of a great life's work approached more perilously near oblivion and still be enrescued and enshrined in proper setting, than did that of the conchologist J. F. Bolten, of Hamburg. His life was practically his collection, systematically arranged, large, beautiful. In the arrangement of his collection he followed his own system, far in advance of that proposed previously by Linnæus. An outline manuscript was prepared of this system, and some illustrations were prepared by an artist-friend, Schulze by name, but death deprived the work of the artist's aid, and Bolten's infirmities prevented the prosecution of the undertaking. The outline of the system published by the family in 1798 after Bolten's death would only have been of value to the world as showing the size of the Bolten collection had not a second friend, Roeding by name, seen to it that specific names were accompanied by references to Gmelin's "Systema" and to the figures in the Conchylien Cabinet and elsewhere. In 1819 another edition serving as a sale catalogue was published; but both editions have long ago become very scarce and well-nigh forgotten. Again, a third friend, Dr. Dall, in a distant land, united a private donation with a small grant from the American Association for the Advancement of Science and had the same turned over to Sherborn and Sykes of the British Museum (Nat. History) who brought out a phototypic copy of the edition of 1798 (1906). Now, we have before us finally an elaborate and convenient index to this edition prepared by the same thoughtful friend and published as noted above by the Smithsonian Institution. It is naturally to be regretted that funds did not permit of the publication of the index with the volume, but nevertheless there is real satisfaction in feeling that the work is now in

available form and the labors of Bolten shall not be forgotten.

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THE PROCEEDINGS OF THE NATIONAL
ACADEMY OF SCIENCES
(NUMBER 6)

THE sixth number of Volume 1 of the *Proceedings of the National Academy of Sciences* contains the following articles:

1. *Confirmatory Experiments on the Value of the Solar Constant of Radiation:* C. G. ABBOT, F. E. FOWLE and L. B. ALDRICH, Smithsonian Institution, Washington, D. C.

Observations at Mt. Wilson from sunrise until ten o'clock and records obtained by a recording pyrhelometer attached to sounding balloons rising to the altitude of 24 km. confirm the value 1.93 calories per square centimeter per minute previously obtained for the radiant energy received by the earth from the sun.

2. *Variation of Flower Size in Nicotiana:* T. H. GOODSPEED and R. E. CLAUSEN, Department of Botany, University of California.

During five years of study of the inheritance of flower-size in *Nicotiana*, it has been found that the flower-size is not so constant as it has been assumed to be, but is affected by a number of conditions, some of which may not effect the length and the spread of the flower in the same manner.

3. *Retention in the Circulation of Dextrose in Normal and Depancreatized Animals, and the Effect of an Intravenous Injection of an Emulsion of Pancreas upon this Retention:* I. S. KLEINER and S. J. MELTZER, Department of Physiology and Pharmacology, Rockefeller Institute for Medical Research.

In normal animals the circulation possesses the ability to get rid readily of a surplus of dextrose injected intravenously. This ability is impaired in the absence of the pancreas, but can be temporarily restored by intravenous injections of pancreas emulsion. Such injections, moreover, are capable of reducing the hyperglycæmia due only to depancreatization.

4. *Parthenocarp and Parthenogenesis in Nicotiana*: T. H. GOODSPEED, Department of Botany, University of California.

Mrs. R. H. Thomas found frequent cases of parthenogenesis in *Nicotiana*; but other experimenters have been unable to verify these results. The present investigation, conducted upon the particular strains of tobacco of which seeds were furnished by Mrs. Thomas, shows that in those strains parthenocarp is a frequent occurrence and that parthenogenesis is also peculiar to this variety.

5. *Exogamy and the Classificatory System of Relationship*: R. H. LOWIE, American Museum of Natural History, New York City.

The exogamous factor must have been a real cause in moulding the kinship terminology of at least some so-called classificatory system. This conclusion is reached by a study of the character of two Siouan tribes, the Crow and Hidatsa.

6. *Solution of an Infinite System of Differential Equations of the Analytic Type*: F. R. MOULTON, Department of Astronomy, University of Chicago.

If the number of mutually gravitating bodies in the universe is infinite, and if beyond a finite number of them their initial distances from one another increase with sufficient rapidity as the number of bodies increases, there is a rigorous, though limited, solution of the problem of infinitely many bodies.

7. *Sex Ratio in Pigeons, together with Observations on the Laying, Incubation and Hatching of the Eggs*: L. J. COLE and N. F. KIRKPATRICK, College of Agriculture, University of Wisconsin.

A seven-years' study of inheritance in pigeons leads to the conclusion that the normal ratio of the sexes of pigeons hatched is 105 males to 100 females; that the number of unisexual broods exceeds the number of bisexual broods; that there is no tendency for first-laid eggs to hatch males and second-laid eggs to hatch females; that there is a correlation between the time of hatching the second egg and that of laying the first; that the birds continue to set beyond the normal period of incubation if the eggs do not hatch.

8. *Vividiffusion Experiments on the Ammonia of the Circulating Blood*: A. ROHDE, Department of Pharmacology, Johns Hopkins Medical School.

The generation of ammonia in shed blood occurs in the non-diffusible constituents of the blood.

9. *126 Parabolic Orbits of Meteor Streams*: C. P. OLIVIER, Leander McCormick Observatory, University of Virginia.

Although the most important feature of this investigation is the calculation of 126 parabolic orbits, the most interesting result is the final proof of the connection of the Halley's and η Aquarid meteors. It is further concluded that radiants are not stationary.

10. *The Basal Silurian Formations of Eastern North America*: C. SCHUCHERT, Peabody Museum, Yale University.

Medina, Cataract and Brassfield are to be retained as names for independent marine faunas and formations.

11. *A Method of Obtaining Complete Germination of Seeds in *Oenothera* and of Recording the Residue of Sterile Seed-like Structures*: B. M. DAVIS, Department of Botany, University of Pennsylvania.

By sowing seeds upon pads of filter papers placed in Petri dishes and thoroughly soaked and by keeping the culture under unvariable temperatures rapid germination was obtained.

12. *The Osmotic Pressure of the Ions and of the Undissociated Molecules of Salts in Aqueous Solution*: STUART J. BATES, Throop College of Technology, Pasadena.

The author shows how the partial osmotic pressures of the ions and of the unionized molecules can be calculated by thermodynamic principles from the freezing-points and conductance-ratios at a series of concentrations. The results show that in general the osmotic pressure of univalent ions is considerably smaller and that that of the undissociated molecules is very much larger than would be required by the osmotic-pressure law of perfect solutions.

13. *The Extension of the Spectrum beyond the Schumann Region*: THEODORE LYMAN, Jeffer-

son Physical Laboratory, Harvard University.

The author has been able to reach the wavelength λ 600, and finds 7 or 8 lines in the helium spectra between λ 900 and λ 600, some of the lines being fairly strong.

14. *Unsymmetrical Lines in Tube-Arc and Spark Spectra as an Evidence of a Displacing Action in these Sources*: A. S. KING, Mount Wilson Solar Observatory, Carnegie Institution of Washington.

The observed effects seem to be harmonized by considering as a necessary condition the presence of electrified particles moving at high velocities, these being produced in the arc and spark by the strong potential-gradients and in the tube-arc by the large consumption of energy.

15. *On the Factorization of Various Types of Expressions*: HENRY BLUMBERG, Department of Mathematics, University of Nebraska.

The methods of E. H. Moore's "General Analysis" are applied to giving a uniform central theory for factorization of different series of expressions.

16. *The Direction of Rotation of Sun-spot Vortices*: GEORGE E. HALE, Mount Wilson Solar Observatory, Carnegie Institution of Washington.

Of the two spots in the typical spot-pair the preceding spot in the low-latitude zone is counter-clockwise north, and clockwise south, of the equator; corresponding to the direction of the rotation of terrestrial tornados. In high latitudes the signs are reversed, giving a result which is likely to prove significant in future studies of the sun.

17. *Some Vortex Experiments Bearing on the Nature of Sun-Spots and Flocculi*: G. E. HALE and G. P. LUCKEY, Mount Wilson Solar Observatory, Carnegie Institution of Washington.

Some of the phenomena of single and multiple sun-spots can be imitated by simple laboratory experiments in which vortices are formed in a water tank with an atmosphere of smoke above the water. Such experiments may assist in accounting for certain char-

acteristic structures and motions of the solar atmosphere. EDWIN BIDWELL WILSON

NOTES ON METEOROLOGY AND CLIMATOLOGY

THE WEATHER ELEMENT IN AMERICAN CLIMATES

CLIMATE may be defined as average weather. Thus Professor R. DeC. Ward is fully justified in opening a discussion of the climates of the United States with a chapter on the Weather Element in American Climates.¹ Winter weather is characteristically changeable. The rapid motions of strong cyclones and anticyclones, with the sun low in the heavens, places the weather primarily under cyclonic control. On the other hand, in summer, when cyclone activity is weak and the sun is high in the sky, the weather under the regular solar control is much the same from day to day. In spring and autumn, the interplay of these two controls is strikingly apparent. A cyclone approaches, giving rise to easterly winds, cloudy weather and rain, with a falling barometer. The solar control vanishes. However, as the storm passes and westerly winds follow, the clouds break away and the diurnal control again dominates.

Weather types depend largely on the origin of the winds which flow towards passing cyclones. Thus, on the eastern coast easterly winds are usually damp and westerly ones dry. In winter, the easterly and southerly winds are warmer than those from the west and north, but in summer the west winds are generally warmer than the east. The same holds true for the central valleys and great plains except that the east winds of summer are often warm. Furthermore, the winter cyclones fail to bring much precipitation to the great plains because of the prevailing cold. On the Pacific coast, west winds are damp and equable; while the land winds from the north and east are dry, and bring the extremes of temperature.

The frequency with which different weather types occur, depends primarily on the paths and frequency of cyclones. In winter, cyclone paths cover practically the whole United

¹ *Annals of the Association of American Geographers*, Vol. IV., 1915, pp. 3-54.